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MONOCULAR DIPLOPIA WITHOUT MANIFEST
LESIONS OF THE AFFECTED EYE.

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Read before the Chicago Medical Society.

In the month of October, 1881, James E. Adams, of London, England, brought before the Ophthalmological Society of Great Britain and Ireland the subject of uniocular diplopia. The question was confined to the existence of the phenomenon in the absence of any abnormal condition of the iris, lens, vitreous, fundus or any marked error of refraction of the affected eye, the question resolving itself into this, is it possible for an eye, not the subject of any manifest deformity to project two images of one object? or are two mental conceptions possible from one impression on the retina?

Mr. Adam's attention was directed to the subject in connection with a suit for damages against a railroad company by a "hysterical woman." This occurred in the Spring of same year, 1881, the symptoms said to have existed in the case were "insensibility, coming on half an hour after an alleged railroad

injury, lasting for three or four days, followed by vomiting, then convulsions, then convergent strabismus lasting for some weeks."

At the time of examination by M. Adams "both eyes were normal in all respects, the excursions of each separately, were perfect and all the associated movements equally good. She declared that with the right eye she saw two distinct images of a pencil held at twenty inches, separated by an interval of some inches and on the same plane."

He further adds that he has since seen a little boy with a high degree of myopia who claimed to be the subject of the same phenomenon. It is definitely stated, however, that this phenomenon was observed in the right eye only when the left was closed. No statement is made, however, as to whether the closure of the non-affected eye in the woman's case was necessary to develop the phenomenon. The boy is said to have perceived images of double the number of small objects such as coins that were placed before him, only, however, when the left eye was closed. Mr. Adams, erroneously I think, supposed that with a prism placed base upwards or downwards before the non-affected eye the boy should have, if he were not simulating, seen three objects instead of two.

He sums up his remarks by saying that "up to the present time (1881) he had never met with a case in which uniocular diplopia, in an eye that was physically perfect, was alleged to exist except under circumstances where there was strong ground for doubting the validity of the patient's statements." It would have been pertinent to have asked if Mr. Adams had ever before seen a case in which uniocular diplopia was claimed without lesion of the affected eye.

He further states that after the receipt of the claimed damages she speedily recovered, but the statement is too indefinite to be of any scientific value. He does not say that he saw and examined the woman, nor does he refer to anyone else who did.

At the same meeting of the society Dr. W. M. Ord narrated

in full two cases of uniocular diplopia. The one case, a man of twenty-eight, may be subject to a certain amount of doubt, and apart from other cases would be of but small value. But in consequence of the agreement of this case in certain particulars with other cases in which there can scarcely exist a justifiable scepticism it is not without value for comparison.

In neither of the cases referred to by Mr. J. Adams is any mention made of external paralysis, in fact, we are assured in the one case that it did not exist, although according to the woman's claims it had existed and her statements coincide with the observations of others in later cases, and in the other we are justified in assuming that it did not exist at the time of observation.

In the first case mentioned by Dr. Ord we have the existence of paralysis or paresis of the external recti distinctly stated.

There is in this case no mention made of the condition of the iris, although in all probability the pupil was dilated. We are led to infer, although it is not stated in so many words that when both eyes were used he was the subject of ordinary diplopia arising from the feeble or paralysed condition of the external recti, but no direct statement is made that he saw quadruple images. This is an important peculiarity. You will remember that the closure of the non-affected eye in the case of the boy referred to by Mr. Adams was necessary to the development of the phenomenon.

The second case reported by Dr. Ord was a school-boy, admitted to St. Thomas' Hospital September 3, 1879, 13 years of age. And strange to say the preliminary symptoms are in some respects very similar to the first case referred to by Mr. Adams. The boy, it is true, had an epileptic fit. He was quite unconscious. No general paralysis followed, but he remained drowsy, and for four days had constant vomiting, and both external recti acted imperfectly. There is no note made that the boy ever saw four images when both eyes were open, and there is no statement that he did not. The movements of the eyes caused pain and the pupils were widely dilated.

Mr. Nettleship, of St. Thomas' Hospital, also examined this boy and he says: "I began by simply disbelieving the boy's statements, but repeated and varied trials by others as well as myself left little doubt that at any rate the boy was sincere in his statements."

It will thus be recognized that the phenomenon, if it exists, is an unusually rare one and that it devolves upon anyone who presents a case to detail the most minute particulars.

This boy was again later admitted to the hospital, and was under Mr. MacCormac's care for an abscess on the back of the neck. Nothing was then known of his previous history. He died quite suddenly Nov. 20, 1880. The post-mortem examination revealed in the right cerebral hemisphere, in the normal position of the right lateral ventricle, an old blood clot, having a slight attachment at its lower surface. It was egg-shaped, about $2\frac{1}{2}$ inches long and one inch thick. A small aneurysm the size of a pea was found a quarter of an inch below the blood clot. The blood vessel connected with the blood clot but the lumen was closed with a continuation of the blood clot. This blood clot, practically a tumor, was distinct and separate from the right lateral ventricle, but it had displaced the ventricle considerably to the left; there was a half inch of tissue separating the space of the blood clot from the ventricle.

At the same meeting Dr. John Abercrombie reported a case which was under treatment at the hospital for sick children, Great Ormond St., in the month of July 1881. The previous history of two months gives a record of headache, vomiting, peculiarity of speech, loss of power on right side for two months, squint for three months, had chorea, no rheumatism, no convulsions. Mother died of cancer, father said to have had fits. One more child of the family "healthy."

The interesting feature for the present study is the existence when admitted to the hospital of paralysis of the right external rectus, slight internal strabismus of right eye, no ptosis. "Sees double with both eyes and also when right eye alone is used. The false image is always above and to the left of the true one. No mention made of the condition of pupils.

Optic discs obscure, right paler than left, veins in both eyes turgid and tortuous.

Dr. Abercrombie says: "During the next few days she was repeatedly examined with regard to the diplopia, but the result was always the same, viz, when the left eye was closed there was double vision, when the right eye was closed her sight was normal."

July 28, unconsciousness developed, slight convulsions, pulse very frequent, breathing irregular, eyes fixed, staring pupils moderately dilated—death.

The autopsy is so significant and the publication in which it appears so little circulated that I give it verbatim:

Autopsy 16½ hours after death. Body weighs 44½ pounds. Rigor mortis marked. Calvaria and dura mater natural. Convolutions flattened, especially in the right posterior region. Surface of brain dry and sticky; the two hemispheres adhere to each other; corpus callosum arched. Pia-mater at base rendered opaque by recent exudation of greenish lymph, a thin layer of which envelops pons Varolii, and causes gluing together of medulla oblongata and cerebellum. The exudation of lymph extends into each Sylvian fissure.

On cutting into the right hemisphere the white matter in the region of the temporo-sphenoidal and occipital lobes is found to be broken down and a large abscess cavity takes its place containing some ounces of laudable pus; the descending cornu of the lateral ventricle is filled with pus and leads directly into this abscess cavity; the lateral ventricles otherwise are dilated and filled with a thin slightly turbid fluid.

Left hemisphere, cerebellum, pons Varolii and medulla oblongata natural; right internal ear natural; left optic disc swollen, margins ill defined. Both lungs show slight hypostatic congestion. A little thickening of mitral valve. Alimentary canal, liver, spleen and kidneys normal. Some of the mesenteric glands a little enlarged and caseous."

Dr. Abercrombie adds there is not the least reason to suspect this child of malingering. She was examined on different occasions without anything occurring to lead us to doubt her

veracity. I think, therefore, we may accept it as a fact that she had double vision with the right eye.

In May 1884, Mr. Marcus Gunn and Dr. J. Anderson again brought the subject before the Ophthalmological Society, of Great Britain, with the presentation of another case, and on the the same occasion Dr. Brailey and Messrs. Juler and Nettleship referred in brief to cases under their care.

The case reported by Mr. Marcus Gunn and Dr. Anderson, was a painter, aged 34 years.

There was paresis of the left external rectus, there was the usual homonymous diplopia of abducens paralysis, but also double images with the left eye when the right eye was shut. Tension in both eyes normal, pupils unequal, left larger, both acted to light and accommodation. On looking upward the right globe made a slight excursion inward on its way, and when he looked to the left his right eye was directed very slightly upward as well as to the left. In other respects the movements of the eye were normal. There was no nystagmus. In other respects the left eye was normal—nothing visibly wrong in the cornea, aqueous, iris, lens, vitreous or fundus. Examination revealed the diplopia to exist over the left half of the field of vision and also over the upper part of the right half; the images got farther apart as the object neared the periphery. It was not possible to obtain the perception of three images by the aid of prisms. This patient was also examined by Dr. Nettleship. There was no reason to suspect the patient of simulation.

A detailed history of this case is given in the report. It involved so many nervous lesions that, although syphilis was denied on the part of the patient, and no demonstration of lesions could be made, he was subjected to anti-syphilitic treatment, and so far improved that the diplopia and the paralysis of the external rectus disappeared. He was still occasionally the subject of attacks of unconsciousness, which were called "fits."

The cases of Mr. Nettleship, Mr. Juler and Dr. Brailey were all associated with paresis of the external rectus and dilatation of the pupil.

I will now give the details of a case at present under my observation which gave rise to my presentation of the subject.

Mary R., 9 years, orphan, no family history obtainable. When she was brought to me her face presented an appearance of great distress, a suppliant expression; her step was cautious, as though she was afraid of jarring her head. The left eye was kept partially closed, not from ptosis, but from the action of the orbicularis muscle. She complained of severe pain in the infra-orbital region, greatly aggravated on pressure over the infra-orbital foramen. There was increased pain on even medium movements of the eye, so much so that she would move the head rather than the eye. The pain, apart from the infra-orbital region, was located rather in the region of the external rectus, and the position of the pulley of the superior oblique. There was no paralysis of any of the muscles demonstrable, and even paresis was very questionable. When the eyes were directed upward the left eye turned inward and the effort was associated with great distress. The difficulty of movement was rather indicative of a pain in the muscles, developed by an effort at contraction. There was a headache which, she said, came on every other day. There had been, and there was no other evidence of any malarial affection.

There was a very slight amount of conjunctivitis of the left eye only, no blepharitis, no other external lesion; cornea, aqueous, iris, lens and capsule, vitreous and fundus were all normal, and there was no detachment of the retina. There had been no complaint made about the right eye, nor did it present any lesion.

V. with both eyes together and each eye separately, $\frac{6}{18}$. N. V. S. O. 6. Pupils normal in every respect; contracts quickly under the influence of light, and normally on accommodation.

She persistently claims double vision with the left eye. On examining her the first time, suspecting some difficulty in the form of paresis of the muscles of the left eye, I asked her if she ever saw two objects instead of one. "With this eye I do," she said, pointing to the left. Quite sceptical, I proceeded to examine her statements.

When a probe was held vertically before her at a distance of 50 cm. she said she saw two, the extra image being projected toward the median line, and a little less clear. She pointed to its location definitely. When, however, the probe is held in a horizontal position, she located the extra image as above the object. The double images do not change their relative distances when moved toward the nasal or temporal sides, nor when the object is moved up or down, only the observation is less satisfactory on account of the discomfort associated with the efforts at movement.

However the experiment was varied, she invariably gave evidence of double vision with the one eye. When one, two or three coins were placed before her, she saw two, four or six.

It occurred to me to measure the relative distance of the extra image when looking at a near object and one that was more remote. Of course such a calculation would be a good check on the accuracy of her answer. The principle involved being that the distance of the extra image from the object at one metre should vary directly as the distance of the extra image at six metres. One measurement which I made before using atropine gave me a displacement of the extra image to the nasal half of visual field of .075 millimetres at a distance of one metre; and at six metres the displacement, according to her location, .400 millimetres. The theoretical distance on calculation would give .450. This I considered a corroboration of the girl's veracity, as the discrepancy could well be referred to inaccuracy in my crude measurements. It would have been impossible for a child of 9 years to have calculated so near in the absence of some actual sensation similar to what she claimed.

Atropine was applied to the eye, and observations were made two days later when the eye was fully atropinized, the pupils dilated *ad maximum*, and the accommodation completely inactive. The same answers were given to the same questions, only she now located the extra image as not only in the nasal and upper half of the field of vision, but as quite a good deal nearer to her than the object. This phenomenon was not

noted before the influence of the atropia. It was not definitely noted that it did not exist, but I think I should have noted the fact when measuring the distances of the extra images from the object, if she had thus seen it.

The vision of left eye, under the influence of atropia, required a lens $S+1$ D to restore the visual acuity that she had before, showing a slight amount of latent hypermetropia. With the $S+1.00$ D, however, vision was $\frac{6}{18}$ as before. No satisfactory explanation was obtained relative to the deficiency of visual acuity, whether it might be referred to retinal asthenopia or cortical asthenia.

The exact displacement of the extra image at one metre during the influences of the atropia was difficult because of the above-mentioned fact that the extra image was nearer to the eye than the object, but approximative measurements gave the distance at one metre to be .065 millimetres and at six metres the distance of the extra image was claimed to be .330 millimetres. Theoretical calculation would have .390 mm. It will be remembered that under atropia the extra image seemed less distant than the actual object when near objects were under observation, but the phenomena did not exist when looking at objects at a distance of six metres. It did not occur to me to inquire at what distance this phenomenon ceased to be observable.

Pursuing investigations further I found the girl to be completely red-blind. She has no conception of any difference between greens and grays; and purple, blue and violet she puts together as similar colors.

The above observations were made at intervals between November 12, 1887, and December 4, 1887. On December 4, when in church, she felt that she could neither speak nor breathe and then she was unconscious. Convulsions followed which were said by the Sisters to have lasted for four hours. After a period of consciousness the convulsions were renewed the same night and said to have continued for a similar period. After this she felt pain all over the body. Confined to bed.

Dec. 8, at a consultation with Dr. D. W. Brower, Prof. of Ner-

vous and Mental diseases at the Woman's College, the double vision with the one eye was demonstrated. Dec. 13, has been frequently delirious since last record; cannot keep anything on the stomach. When delirious complains of pain on the top of the head. Buries her head as much as possible in the pillows. Pulse has varied from 60 to 75 and the temperature has scarcely varied from the normal. Dec. 15, has been very restless—slapped and tore the hair of her little attendant, all at once however, she became better. She slept well, complained of no pain, and ate her food, and the vomiting ceased. For the first time since she has been under my observation she can now look up without experiencing pain. There is no mydriasis, no lack of accommodation and no paralysis or paresis of the external ocular muscles.

She still sees double both with the two eyes open and with the left eye alone, the false image referred to the same position whether the right eye is open or closed. It is always in the nasal and upper half of the visual field. I could not get her to acknowledge any inclination of the images.

Dec. 23, she left the institution in charge of the sisters and the sister in charge reported, she seemed as well as ever but less active and less capable mentally.

Jan. 19, '88. As she did not return to school, I visited her at home. I found her afflicted with abscesses all over her body, some under the arms and on the forearm. The left eye was giving her no pain, but the double images were present, and a pain which she said was similar to the pain which she experienced in the left eye was appearing in the right eye.

As I do not expect to see her again, I close the report here. The etiology, pathology and location of the cerebral lesion are all involved in so much obscurity that I shall add only a few words.

The similarity of the main features of the case to the two cases above referred to made me suspect from the first time I saw the child the existence either of brain tumor or abscess. The location of the tumor or abscess, simply from the two autopsies referred to above, I referred to the right cerebral hemi-

sphere in such a position as to encroach on the lateral ventricle. I have no theory whatever to present relative to the possibility of double images under the circumstances. The development of convulsions and their persistence at intervals with the associated vomiting strengthened that opinion. The increased severity of the symptoms on the 14th, and the sudden improvement made me suspect an abscess and its rupture into the third ventricle. The development of abscesses over the body in about two weeks after the sudden improvement, made me suspect that these abscesses were of a metastatic character. As to the character of the primary abscess, I have not sufficient data to justify any conclusion, and the want of education on the part of the person now in charge of her precludes investigation.

CHRONIC (SIMPLE) GLAUCOMA.¹

D. COGGIN, M.D., SALEM, MASS.

In the six months ending last January, it was my lot to see four patients having, what till recently was termed, *chronic simple glaucoma*, all of whom consented to have an iridectomy performed. Two submitted to a double operation.

As the symptoms did not vary materially in the four cases, the history of only one will be given—and that but briefly.

April 10, 1882.—Mr. L., æt. 63 years. Native born. Wheelwright.

Left eye—sight poor for years, and it now amounts to the counting of fingers, held to the left, at 50 centimetres. Pupil small and inactive. T + 1 (?) Atrophy with marked excavation of the optic nerve. No external signs of glaucoma in either eye.

¹Read at the Annual Meeting of the American Ophthalmological Society at New London, July 21, 1887.

Right eye—V.=Sn. 18. at 4. +1.25=4. at 4. and with + 4.5 V.=Sn. .50 at .30.

Pupil and T. n. Has seen less well of late.

Rainbow-colors at night, when tired. No pain. Excavation of disc and bending of vessels. No spontaneous pulsation. Field of V. normal. Color sense not affected. Is of a nervous temperament. Is restless nights. Rarely drinks a little punch, and ordinarily smokes six mild cheroots daily. Regular living advised and potassium bromide and strychnia with acid phosphate were ordered, with the injunction to return at once if pain should appear in the eyes.

Two months later the left eye had become quite blind and it had at times been painful, which the instillation of an eserine solution relieved.

In January, 1886, the tension of the right eye seemed increased and the use of eserine was advised in that eye. Pupil not enlarged, but it responded sluggishly to light.

He read Sn. 5. at 4 metres with +1.75, and with +5. he could still make out Sn. .50.

A year later the vision had fallen away, and amounted to Sn. 6. at 4. (with +1.75). Field of vision contracted. Anterior chamber shallow.

The time had now come when operative interference seemed called for, with the idea of preserving the remaining sight.

In this, as well as in several other cases of simple glaucoma, eserine was apparently of no value in arresting the advance of the disease.

The advisability of doing a sclerotomy naturally occurred to me.

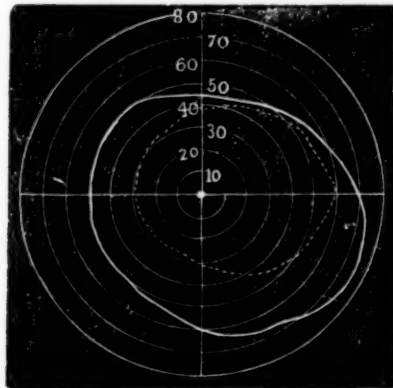
This operation (performed with a Graefe's knife in preference to a Wecker's sclerotome) had, five years before, been of some help in the case of an artist but, unfortunately, death occurred within a year, so the history of the case possesses no clinical value.

In the absence of pain, Badal's operation was not considered, and it was deemed best not to attempt that of Mr. Cowell, and it was finally determined to treat this case like one of

acute, or of chronic, glaucoma. An iridectomy was accordingly done, upward, on the 15th of last January. Cocaine was employed, and it produced nearly complete anæsthesia, the reverse having, in my experience, been the invariable rule in patients having acute or inflammatory glaucoma. Free hæmorrhage followed the incision through the cornea and the further steps of the operation were executed with difficulty.

On the following day the blood had so far disappeared as to show a small but satisfactory iridectomy and, also, a quite extensive dialysis of the iris, but separated from the coloboma.

(In a patient who underwent a double operation for the same trouble shortly before, the bleeding was so great that, after the absorption of the blood it was with chagrin that the iris was found to have been excised at a considerable distance from



its insertion and, as a possible result, nine months later, the central vision had fallen off one-half).

Two weeks after leaving the hospital Mr. L.'s right visual field was examined and its area is represented by the dotted line on the accompanying plate—the heavy white line indicating the (minimum) normal field of vision.

At the expiration of seven months it remained practically unchanged. Vision the same as before the operation. Photophobia, due to the artificial pupil, was complained of. T.n. (?).

The very trite history of this case of simple glaucoma is here offered, with the hope that it may evoke such an expression of opinion as will throw some light as to the most satisfactory course to follow in treating this not uncommon affection.

Without some sort of operative procedure there is, ordinarily, a progressive deterioration of sight.

For example, a man consulted me five years ago who presented the usual symptoms of simple glaucoma, but who positively declined an operation, although he was from time to time urged to submit to one.

At present he is blind.

Some years since a gentleman, whom I afterwards saw for a simple external trouble, consulted a practitioner on account of simple glaucoma. Alarmed because he was advised to have an operation done then and there, he sought advice of another surgeon who counseled delay. An iridectomy was not performed. The gentleman now has to be led about.

Further illustrative cases are scarcely called for. The question is—despite the accidents, possible visual disturbances, and, perhaps, further loss of sight, that noted authorities affirm may follow an iridectomy—does not the performance of this operation in simple glaucoma give to the patient a better expectation of retaining his remaining vision than can be hoped from any other method of treatment?

BRITISH MEDICAL ASSOCIATION—SECTION OF
OPHTHALMOLOGY.

The following papers and reports are taken from the *British Medical Journal* :

W. A. McKeown on One Hundred Consecutive Cases of Cataract, Mature and Immature, Treated by Intra-ocular Injection.

The question of intra-ocular injection in the extraction of cataract, brought by me before the profession in 1884, has occupied so much attention, particularly on the Continent, that I embrace the opportunity now presented of stating my views and my most recent experience before the representatives of ophthalmology of various nationalities.

From the time I began the practice in 1884 till the present time, I have used intra-ocular injection in every case in which it was indicated. I have followed generally the lines laid down in my address to the Ophthalmological Section at Belfast in 1884. My views at that time are my views now. I have proceeded cautiously step by step, operating on cataracts less and less mature, until I have reached the practical point of extracting lenses which are sufficiently clear to admit of patients going safely about, but presenting too much opacity to enable them to follow their occupations. I consider it a blemish on ophthalmic surgery that patients with opacities of the lens requiring very many years to develop to anything like maturity, as hitherto understood, should be obliged to go about doing nothing, losing health, strength, spirit, and, if without means or helping friends, to become inmates of workhouses or private charitable institutions.

I purpose now presenting to you the statistics of the last 100 operations for cataract, of all degrees of maturity and immaturity, in which I used intra-ocular injection, and I would remind you that you have no analogous statistics. There is a large number of cases of striated cortex with clear triangles interspersed, and of cases in which the surgeon could see more or less the details of the fundus. All these would be re-

jected by the surgeon practising ordinary methods as unsuitable for operation.

Of the 100 cases there were 81 cases of idiopathic cataract uncomplicated, 5 complicated by affections of the eye or its appendages, and 14 traumatic. Of the 81, 13 patients before operation could see to go about, and could count fingers from two to fifteen feet, but had not been able to work for a considerable period, and the fundus could be seen with more or less distinctness; 9 had striated cortex with triangular areas transparent; making in all 22 of various degrees of immaturity. In the 81 cases there were 8 escapes of vitreous, all slight but one, and of these only 2 occurred during injection. The proportion of escapes of vitreous, though a little more than usual, has, therefore, no bearing on intra-ocular injection. As to the sequences of the 81 operations, there were:

1. One case of panophthalmitis occurring three weeks after operation. On the sixth day I opened the eye, expecting everything right, there having been no complaint. I found vitreous projecting in wound enclosed in unruptured hyaloid membrane. Bandage for two weeks having been continued without material improvement, I cut off projecting vitreous; panophthalmitis supervened. The operation had been perfect in every respect, and I think the prolapse occurred from some injury to the eye.

2. Three cases of pretty severe iritis; fair vision still remaining, and capable of improvement. One counts fingers at four feet, another at one foot, and another at six inches. The first was owing probably to syphilis and rheumatism, and the other two to impaction of iris in angle of wound.

3. Three cases of irido-cyclitis and choroiditis. *a.* One in case of patient (in whom double extraction was performed) who would not allow bandage to remain on for six days after operation. Fortunately, only one eye suffered, and when he left hospital the eye was quiet and field good. *b.* Another in case of old congenital cataract with thickened capsule in man, aged 30. Removed thickened capsule with forceps; vitreous began to come; used scoop syringe, as I have sometimes done

successfully in escape of vitreous, but in this instance was obliged to leave considerable part of lens behind. An iritis with a nodule of pus and inflammation of ciliary region developed after some weeks. Made a section; removed remains of lens with syringe with complete relief. Saw him lately, when I found eye perfectly quiet, perception of light good, and tension normal; but as other eye, also operated on, had good vision, I did not propose further operation. *c.* The third in case of man, aged 70, very nervous, and accustomed to stimulants in the morning, as I learned afterwards. Operation normal. On sixth day wound unhealthy, showing a slight focus of infiltration at one part of cornea, and a little pus in anterior chamber. Iris became involved; no pain. Treated by stimulants and hot steeping. Field of vision good, and could see bulk when I saw him a month ago. I have not seen him since, and cannot give further particulars.

Having entered into these details regarding the whole 81 cases, I shall refer in particular to the 13 very unripe cataracts.

CASE I.—Female, 65. (Counts fingers at 2 feet before operation); after operation reads 0.5 at 8 inches with + 18 D.s.

CASE II.—Male, 63. (Before operation counts fingers at 1 foot, pupil undilated); reads 0.8 at 8 inches with + 18 D.s. after operation.

CASE III.—Female, 70. (Before operation counts fingers at 15 feet); after operation reads 0.5 at 7 inches with + 18 D.s.

CASE IV.—Male, 61. Opacities in lens ill-defined, slight central haze of cornea; sees No. 3 Sn. at 4 inches; can see disc; extensive posterior staphyloma. After operation reads 2.25 Sn. at 4 inches with + 16 D.s.

CASE V.—Male, 57. Before operation counts fingers at 3 feet; after operation reads 1.75 with + 18 D.s.

CASE VI.—Male, 51. Able to go about. After operation, iritis. Syphilitic and rheumatic subject. After operation counts fingers at 4 feet; iridectomy indicated; other eye perfectly successful.

CASE VII.—Male, 63. Before operation counts fingers at 2 feet, can see large part of fundus; after operation sees 0.5 at 5 inches with + 18 D.s.

CASE VIII.—Male, 55. Sees 1.75 at 3 inches, very myopic always, vision same for years, can see fundus; after operation sees 0.6 at 4 inches with + 18 D.s.; will probably be further improved by tearing capsule. After tearing capsule he came to see 0.5 at about 10 inches with very weak convex glass.

CASE IX.—Male, 61. Iridectomy performed by another surgeon four years ago, probably for simple glaucoma; always very myopic; small radiate opacities only; can see fundus. After operation reads 1.75 at 4 inches with + 16 D.s. The vision was only slightly improved by operation; slight irritation and fluctuation of tension for a long time after operation; slight haziness of cornea.

CASE X.—Male, 55. Obligated to give up work a year ago; left eye simply a central cloudiness and some peripheral streaks of opacity; can see fundus. After operation sees 0.5 at 8 inches with + 18 D.s.

CASE XI.—Same patient. Right eye same condition; find he can read with great effort smallest type, but could not see far off, which he required to do for his work, and he desired operation. After operation and subsequent needling of wrinkled capsule sees 0.5 at 8 inches with + 18 D.s.

CASE XII.—Male, 50. Not able to work for four years, and vision stationary; can see fundus; superficial radiate opacities. On injection some vitreous came with transparent cortex. After operation could read small type, but I have not note of exact particulars.

CASE XIII.—Female, 64. Other eye operated on previously successfully; can see fundus, but in a haze. On sixth day after operation severe pain, which I found owing to impaction of iris in one angle of wound; removed incarcerated iris; eye became quiet, but requires iridectomy. Counts fingers at six inches.

Several of these thirteen cases represent the ultimate point to which ophthalmic surgery in the matter of cataract operations can be expected to reach.

As to the other nine cases of immature cataract, with striated cortex and transparent segments, the results were all excellent.

I have nothing to remark about the five complicated with serious affections of the eye and its appendages, save that in one complicated with a chronic dacryocystitis, which latter affection was treated in the usual way for a week before operation, the eye was lost from suppuration of the cornea, notwithstanding thorough antiseptic treatment before, during, and after operation, including injection of M. Panas's solution into the interior of the eye, and application of Galezowski's gelatine antiseptic disc over the wound.

Of the fourteen cases of traumatic cataract, a considerable number were immature, but I have only to note one mishap—namely, a panophthalmitis starting from the wound, notwithstanding thorough antisepticism, so far as it could be carried out. The patient was beyond control. He would not allow bandage to remain for ten minutes at a time after the operation.

I have entered into these particulars because without them bare statistics would be very misleading. Of the three cases of panophthalmitis in the whole hundred, not one can be attributed to the injection, and not one could have been avoided except by not operating, or by putting the patients under a sort of prison discipline. Of the three cases of iritis in the 81 vision may be improved, and of the three cases of iridocyclitis I can only speak definitely of one; but assuming that the other two, which I have not seen for some time, have taken the worst form, I should only have a total of 3 complete losses in 81 operations on idiopathic uncomplicated cataract, including the 22 unripe.

I shall now touch very briefly on some general questions.

1. Is injection of distilled water previously boiled and reduced to the temperature of the body attended with any appreciable danger as regards the introduction of germs within the eye? In all cases except thirty (in which I injected M. Panas's solution), I have used distilled water, and in not one case have I seen any evidence of intra-ocular inoculation.

2. Is injection dangerous because of the force employed to remove cortex? As may be observed from the notes of un-

ripe cataracts operated on, the water must have exercised considerable force to clear out transparent and sticky cortex, yet the results are quite as good as in the ordinary operations for mature cataract.

3. Is the injection of M. Panas's solution desirable? I have injected it only 30 times in 100, and therefore cannot speak very decidedly about it. I would remark, however, that in two cases it did not prevent suppuration of the cornea and panophthalmitis; true, in one case there was an affection of the tear passage, and in the other the patient was unmanageable. I fear it has an influence, though it may be a small one, in causing iritis. I have seen extensive posterior synechiæ and muddiness of posterior surface of the cornea arise from its injection into the anterior chamber after removal of a cyst of the iris. At any rate, I have found no advantage from it, and have abandoned it.

4. Is the injection of M. de Wecker's solution of eserine desirable? I have injected it nine times, and I have used the solution a considerable number of times by simply pouring it into the conjunctival sac, and easing the pressure of the eyelids on the ball, so as to facilitate the entrance of the solution into the anterior chamber, and I have found that the latter mode is quite as effectual in contracting the pupil as the former, indeed, perhaps more so. I do not apply the bandage till the pupil is well contracted. I have noticed in some instances some adhesions, and have been obliged, because of pain, occasionally to apply atropine; but I have so far found no positive disadvantage from the eserine. I wish to do strict justice to M. de Wecker's eserine treatment, and therefore add that in one respect I have not followed his advice, namely, in removing a piece of the anterior capsule. I have simply torn it freely.

5. Should force be used in the injection? I consider it impossible to remove the cortex in the majority of cases of immature cataract on which I operate without force. The more cortex left behind, the less likely is force to do harm, and the more it is required. I am never troubled because of the

quantity remaining after the nucleus is expelled. It is a mistake to suppose that one injection—at least by the old syringe, whose piston was too easy—is always enough. Sometimes two or three are required; but it is probable, with the improved piston of the new syringe, the clearing out of the cortex may be more easily accomplished. Experience teaches the surgeon what he can safely do. He should use injection at first in cases in which he is not likely to experience any difficulty; then take up cases of striated cortex not far from being ripe; and, finally, cases of very slowly progressing cataract, such as those of which I have given particulars. In this way he will acquire confidence and the dexterity born of experience.

6. Allied to the question of force is that of the instrument to be used. One of the most striking things about this question of intra-ocular injection is the number of instruments devised since 1884. I at first used the force of gravitation, and changed to injection. M. Wicherkiewics uses the force of gravitation from his "undine," and the force may be considerable. M. Panas describes his instrument as follows: "*L'instrument laveur du globe est analogue à un compte-goutte muni d'un tube en caoutchouc durci.*" M. de Wecker's consists of a body like a small-sized ear speculum, the wide extremity being covered by india-rubber, and the small end having a silver terminal to introduce into the eye. He says: "*C'est évidemment le meilleur instrument de contrôle car la pulpe si sensible du doigt indicateur appliquée sur le tambour permet de régler avec la plus grande précision le degré de pression qu'on veut exercer pour introduire le liquide à injecter dans la chambre antérieure.*"

M. de Wecker also points out as an advantage of his instrument and method, that the danger of suction is avoided, and the tension of the eye estimated and regarded. If the tension is high, the small aperture in the nozzle of his instrument may be obstructed. I hold that the instrument should be so constructed and capable of exercising such force as to clear out the remains of the lens, without regard to tension. The very

small instruments, with small capacity, with tiny nozzles and small slits and holes in the sides and in front are insufficient to cope with ease with unripe cataract, but are doubtless useful in washing out the anterior chamber and interior of the capsule in ordinary operations. My instrument is so constructed as to yield a free and broad flow regulated in its force by the finger on the piston, just as the force in M. de Wecker's instrument is regulated by the finger on the india-rubber covering of his *compte-goutte*. The finger is just as delicate a regulator of force in one case as in the other.

In the new instrument I present to you you will find many changes. There are two bodies of syringe of different lengths, and various nozzles of different lengths, widths and forms to suit different hands and sections of different position and size. I have found that the syringe and nozzle hitherto in use are unsuitable for the upper section in very prominent eyes, particularly if the hand of the operator is short, and likewise for lower and for lateral sections. I have, therefore, provided short nozzles of various widths and lengths. The chief idea to be borne in mind is: that the various nozzles are only the channel for conveyance of the water power, and are not to be regarded as ordinary scoops or levers, and are therefore not to be considered as agents for exercising the ordinary mechanical force of scoops. The terminals with a little edge at the end, like that of Critchett's scoop, may be used as scoops, but they are only meant by a little to and fro movement, and not by a leverage action, to aid the removal of masses of adherent cataract set in motion by the water. A new form, with a scooped out part at each side, is meant to break the force of the water in cases requiring little force.

7. Should iridectomy be performed? In one of my papers I stated that I considered iridectomy should be performed in all cases of intra-ocular injection. M. de Wecker points out, however, that intra-ocular injection has a marked influence in causing contraction of the iris, and therefore ensuring a greater immunity from the old blot in the old flap operation—prolapse of the iris. He adds to the beneficial effect by using a

solution of eserine instead of plain water. He, however, considers iridectomy necessary in immature cataract. I entirely agree with his view as to the restriction of iridectomy, and now I always operate on cataracts, mature or nearly mature, in patients on whose obedience to instructions reliance may be placed, without iridectomy; but in very immature cataracts with iridectomy. I do not now, as a rule, inject eserine into the eye, but instil it freely, as I have already stated.

8. General applicability of intra-ocular injection. A point which cannot be too much impressed is the wide sphere of usefulness of intra-ocular injection. It may be used in every sort of extraction except the extraction of the lens in its capsule: for example, in the flap operation, old or new, with or without iridectomy; in Graefe's operation, in simple linear extraction, as a substitute for the old spoon extraction and the suction operation. It may be applied in unripe idiopathic cataract and unripe traumatic cataract. Its universal applicability is one great feature. The gentle, moderate, and diffused power of a fluid is substituted for leverage instruments and pressure outside the eye. It rejuvenates old methods discarded, unsettles old notions about ripeness of cataracts, and brings us nearer the goal of the surgeon—to give speedy and effectual relief to sufferers hitherto doomed by imperfect methods to long years of delay and misfortune.

I do not wish to say that anyone of all the instruments devised for intra-ocular injection is perfect. I wish to emphasize the method as that of the removal of cortex by the force of a fluid. The operation for cataract is a purely mechanical procedure, and I hope that year by year we shall more and more perfect our appliances, and that all the instruments we have hitherto devised may be replaced by others more effectual, and that by our labors we shall increase the sum of human happiness.

David Little On the Operative Treatment of Zonular Cataract.

In bringing the subject of zonular cataract before you, it is

my intention to make a few remarks on the operative treatment, and I shall confine my observations chiefly to those cases of ordinary uncomplicated zonular cataract in which there is no arrest in the development of the eye, no shrinking of the lens, and no vitreous opacity or deeper seated disease.

I may say at the outset that I have nothing new to offer in the way of operation, beyond advocating a method which I have found from experience to be the best for gaining good vision. It is this, that when destruction of the lens is decided upon, I recommend a free crucial rupture of the capsule with a needle, so as to make the whole lens opaque and more soft, and two or three days afterwards to perform extraction by means of a Teale's suction instrument.

The disturbance of vision caused by zonular cataract depends altogether upon the extent and density of the opaque layer. If, on dilating the pupil, the zone is broad and perfectly transparent, vision may be fairly good; on the other hand, if the central opacity is great, considerable reduction of sight must exist.

My experience in the examination of the refraction in these cases is that some are emmetropic, a few only are hypermetropic, but the great majority are myopic. I never fail to test the vision before and after atropine, at the same using lenses to correct any defect in the refraction.

In the case of very young subjects whose vision cannot be accurately ascertained I postpone all interference for a time, unless it is quite manifest from the extent of the opacity that sight is bad. It is upon such an examination as this that I base my opinion for operative interference or otherwise.

I recommend destruction of the lens in all cases that are found to be of a progressive character, also in non-progressive cases where vision equal to at least twenty-fiftieths is not obtainable, after dilating the pupil with atropine. I would go further than this in exceptional cases, and say, if I found that twenty-fiftieths was not sufficient sight for the requirements of the patient, and if he or she were between the ages of 10 and 25 (which I consider the most favorable age for operation), with

perhaps some myopia, and all other conditions favorable, I would not hesitate to recommend extraction. When the lens, then, has to be dealt with, there is the operation by solution. This is a tedious process, and I hardly ever adopt it in zonular cataract.

I have been most satisfied with the suction operation. Having dilated the pupil, I make a free rupture of the capsule across the pupil extending from margin to margin; a similar rent is made from above downwards, keeping the needle well in the anterior part of the lens. The capsule is extensively ruptured in this way to cause its retraction well behind the iris, and so avoid secondary operations; the needle should not penetrate too deeply for fear of rupturing the hyaloid or dislocating the lens. A light bandage is placed over the eye, the patient is kept quiet, and atropine freely used to dilate the pupil. After two or three days, or more, according to the condition of the eye, extraction is performed by a Teale's suction curette. This is accomplished by making an incision in the outer part of the cornea, halfway between the limbus and centre, with a double cutting edged needle from 3 to 4 millimètres broad. Through this wound the curette is introduced into the area of the pupil, taking care not to push the open end behind the iris or too deeply into the pupil. Suction is then applied by the mouth, and by this means the whole of the pupil can be easily and rapidly cleared. The patient is then placed in bed, with a light bandage over both eyes; atropine is again used to keep the pupil dilated, and in the course of a week or ten days recovery may fairly be expected.

I have tried a Bowman's suction syringe, but I much prefer Teale's. The advantages of the latter are that suction can be better regulated by the mouth, and the hand is left free to guide the curette, while in the case of Bowman's there is a difficulty in applying suction by the hand, and directing the curette with it at the same time. The advantages of suction over ordinary linear extraction are that the pupil can be cleared with greater certainty, and there is little or no disturbance to the eye by pressure, two conditions, I think, of the greatest importance.

It is said by some there is a danger of suppurative iritis or iridochoroiditis in this suction operation. Speaking from my own experience, I have never met with symptoms so serious as to cause anxiety; and I consider the operation a safe one, if performed with care and judgment. I am careful that the curette is absolutely clean before use, and of late years I have used antiseptics at the time of extraction. On looking over my hospital and private notes during the last eight years, I find that I have performed this operation in forty-two cases, and in the great majority of them I have secured brilliant results as regards sight. The records of some of them are somewhat imperfect, particularly as regards the resulting vision, partly from the youth of the patients, and partly, also, from the difficulty of following up hospital cases. The condition of the eye, however, has been noted in all. In no instance has there been a failure. In three cases there was synechia anterior; in five cases secondary operations had to be performed on account of capsule. In all the others there was a perfectly clear and round pupil, and I attribute this freedom of the pupil from capsule to its extensive rupture in the preliminary operation. The ages of the patients ranged from 5 to 27 years, and I have followed the usual practice of operating upon one eye only at a time.

Regarding iridectomy, I would say that if dilatation of the pupil improves vision to twenty-fiftieths with or without glasses, this operation, generally speaking, should be adopted, with a few exceptions to which I have already referred.

I should prefer iridectomy also, even when only a moderate improvement of sight can be obtained, in all cases accompanied by some mental defect in the patient, arrest in the development of the eye, shrinking of the lens, or when there is evidence or suspicion of posterior disease. When a small iridectomy is desirable, the best method is that recommended by Mr. Anderson Critchett, in a paper he read before this Association, at Worcester, in 1882, to which I would refer you; he uses a broad needle, and a Tyrrell's hook, both instruments bent almost at a right angle, and excises a small portion of the

pupillary margin of the iris downwards and inwards, leaving the periphery untouched.

Referring to the current belief that zonular cataract remains stationary throughout life, I have no conclusive evidence to show that opacity has ever become developed in a zone once absolutely transparent; but I believe that later in life, when the lens becomes harder, the opacity extends to the deeper nuclear layers, and so causes serious deterioration of sight. I have seen at least four cases about 50 years of age, in whom sight had become slowly reduced to 20 Jäger, apparently from no other cause than an increased density of the central opacity, involving the whole nucleus.

In operating upon such cases by the ordinary method for hard cataract, I have always found the eye most intolerant of operation. In every case more or less iritis followed, and many weeks elapsed before recovery took place.

The main purpose of this paper is a recommendation to perform extraction by suction oftener than is generally done, because I think that cases are frequently treated by the easier method of iridectomy, in which the resulting vision is disappointing to both patient and surgeon. Another object is to elicit information regarding the progression or otherwise of this form of cataract.

DISCUSSION.

Dr. Emrys Jones said that his experience led him altogether to question the desirability of injecting any fluid whatever into the anterior chamber after cataract operations; he thought that there was considerable danger of introducing germs in this way, and that there must be greater liability to set up iritis and other complications. He had for the last two years used Mayo Robson's dry eucalyptus spray apparatus in cataract extractions, and he had about 130 consecutive cases without a single case of suppuration of the the cornea and with very few cases of iritis. The resulting vision had been in the majority of cases very good.—Mr. Berry had seen three cases

performed by Dr. McKeown, and must admit that his method was fairly efficient as far as the removal of cortex, which might otherwise give rise to difficulty, was concerned; but as it produced not a little irritation he (the speaker) had not adopted it until more experience had been accumulated. With regard to Dr. Little's excellent paper it was interesting to find that Dr. Little used suction. He (the speaker) had always found linear extraction, which must, however, be done by means of a sufficiently large incision, 4 to 5 millimètres, practically in every way efficient.—Mr. McHardy considered that, having regard to the published analyses of the water supplied by the various London companies, Dr. McKeown's "pumping proceeding" must be fraught with great danger from the introduction of germs. He had been accustomed to utilize the aqueous humor as a solvent for any remaining cortex; this was rapidly resecreted after its escape, and if the eye be closed for a few minutes after the escape of the nucleus, the admixture of aqueous with the cortex materially facilitates its removal by friction. In the cases of immature cataract in which operation was indicated he adopted Foerster's plan of artificial maturation.—Mr. Priestley Smith thought that Dr. Chisolm's claim that he had introduced a novel method, which would revolutionize practice, went beyond the merits of the case. His friend Mr. Hodges would bear him out in saying that at the Birmingham Eye Hospital, fifteen years ago, closing the lids with strips of black court plaster, without pad or bandage, was a favorite method of dressing cataract operations. The speaker had employed it largely, and decidedly preferred it in glaucoma iridectomies. It was, he believed, a very old line of practice. In using adhesive plaster, it was important to leave an exit for tears, and he thought itching was rather more apt to occur than under the pad and bandage. As to confinement in bed, it was not of great moment whether we kept our patients in an upright or in a horizontal position, but it was very important to avoid frequent or sudden changes in the position. Sudden changes in the pressure of the blood column easily led to reopening of the wound and to hæmorrhage into the

chambers. Such slight transgressions as stooping to reach a shoe or to move a footstool, or, as in one case of his own, carrying a coal-box, were dangerous shortly after cataract extraction. If operating surgeons were to disregard common sense and time-honored principles, we should soon hear of disasters. With regard to dark rooms, the speaker's own hospital patients lay in large wards, occupied also by medical cases. He gave more or less protection by a bed-curtain, but had never employed dark rooms.—Mr. Adams Frost had used Dr. McKeown's method on several occasions, and as far as its mere mechanical effect was concerned, had found it as efficient as friction; the risk of infection, however, rendered it imperative to take elaborate precautions, and as there was always the uncertainty beforehand whether injection would be required, this had led to his abandoning the proceeding.—The president said that Dr. McKeown's method was not one that recommended itself to his surgical instinct, and the results that Dr. McKeown had himself adduced would not encourage him to attempt it in the future.—Dr. McKeown, in reply, said with respect to the surgical instinct of the president being against intra-ocular injection, the surgical instinct of the profession, as a whole, in relation to new operations, was invariably wrong for a variable period of time, when the new operations were much at variance with old practice and preconceived notions. The surgical instinct of the profession generally was long against ovariectomy, but the surgical instinct of the ovariectomists had proved to be a safe guide. The same held about more recent questions. The president had taken an entirely wrong view about the bearing of the statistics. A little escape of vitreous was not a serious matter, and, in the eight cases referred to, only two had any relation to the question under discussion, namely, intra-ocular injection. His paper, when carefully read, would show that, taking the whole cases, complicated and uncomplicated, ripe and unripe, idiopathic and traumatic, the statistics were most assuring, and quite equal to the statistics of selected cases of mature cataract. In the whole 81 cases of idiopathic cataract (including 22 cases of most unripe

cataract, on the majority of which no surgeon with the ordinary methods would operate), there were only three total losses at the utmost. As to the case of the president, in which injection did not remove any unripe cortex, the probability was that the terminal had not been introduced inside the capsule. The president thought that some of the cases described were not simply immature cataract, but incipient cataract; but, if incipient cataract of one to three or four years, or more, standing could be operated on by injection, nothing further was required to put it on a level above any other operation ever practiced. Dr. Emrys Jones and Mr. Mc Hardy, without having had any experience of the method, or even having seen anybody use intra-ocular injection, had condemned it. No doubt the most competent critics were those who knew nothing practically about it—of course, they were far better able to judge of it than one who had been using it for three years in a public institution, open to the profession, and who had, on every occasion possible, demonstrated its utility to students and medical men. As to the cases mentioned by other speakers, they only amounted to six or seven, and they were not to be taken into serious consideration in face of the details Dr. McKeown gave in his paper, and of the experience of the most distinguished Continental ophthalmic surgeons. Mr. Priestly Smith inquired respecting the size of the nozzles. It was well known that, if water be driven with force through a very small opening, the force exerted on a limit area was very much greater than if the same force were exercised through a wide opening. The object was to direct a pretty uniform force on the whole of the internal surface of the capsule, and not a strong force on any one point. The nozzle being broad and the slit long, this was accomplished. Besides, the broad nozzle gave support to the vitreous humor. The capacity of the body of the syringe was considerable, as it was a mistake to have only a few drops when force had to be used. When the operator had more than he required, he need not use it; when he had too little, he had to remove the instrument, and replenish it.—Mr. Snell, replying to the remarks made on the treatment advocated in his

brief communication, pointed out that many of the subjects raised had been dealt with in his former article. His mode of cutting the plaster allowed for the escape of tears, and patients did not complain of any discomfort; but those who had been treated otherwise on previous occasions acknowledged the greater comfort of the plaster treatment. He was not aware that Mr. Priestley Smith had used plaster so much in his practice. The method he had advocated, however, appeared more complete than had previously been adopted. Referring to Dr. Little's paper, he remarked that he had not seen the danger from using the suction curette which in some hands had been experienced. For some time he had used suction very little because it appeared unnecessary, for if the lens were well hooked up, the softened matter readily escaped through a small corneal wound. His rule was to introduce as few instruments as possible into the eye.

CORRESPONDENCE.

"VISUAL RECORDS."

EDITOR.—Since the appearance of my article on "Visual Records" in your December number, I have run across Landolt's description of Monoyer's test-type, between which and those I suggested, there seems to be a strong similarity.

I have access, at the present moment, neither to Monoyer's original description nor to a copy of his test-type, and therefore cannot say how close this similarity may be. If my proposition is already old, it has certainly suffered an unmerited neglect, but whether old or new it is of such manifest practical usefulness, as to deserve the careful consideration of those members of the profession who are desirous of simplifying and unifying our case-records. Yours very truly,

HAROLD B. WILSON, M. D.

ANN ARBOR, MICH.

EDITOR AMERICAN JOURNAL OF OPHTHALMOLOGY:—There is one point in regard to granulated lids which I have very frequently noticed in practice, but cannot recall any mention of by writers, and that is the offensive odor so distinct and frequent about the eyes of these patients. I would be glad to have your opinion in regard to it. Also allow me to correct the error made by Dr. S. M. Burnett, of Washington, D. C., who, I believe, made the statement some months ago that granular lids was a disease almost unknown in the negro race. As I live in a section where nearly one-half the population are negroes, and know whereof I speak, I know that I encounter the disease among negroes *very* frequently, and if I desired this class of practice, I could treat very many more cases among negroes than I do.

Very truly,

R. O. COTTER.

MACON, GA.